

### REMARKS

Claims 1-16, 18, 20-41, 43, 45-63 were pending in the present application. Claims 1, 21, 25, 30, 40, 45, 46, 50, 55, 57 and 61-62 have been amended. Claims 1, 25, and 62 were amended to include subject matter of now cancelled claims 21 and 46; therefore, no new matter has been added. Claim 56 was amended to include the allowed subject matter of now cancelled claim 57; therefore, no new matter has been added. Claim 55 has been amended to include the allowed subject matter of claim 56. Claims 30, 40, 45, 50 and 61 were amended to correct inadvertent typographical error. Thus, claims 1-16, 18, 20-41, 43, and 45-63 are now pending in the instant application.

Reexamination of the application and reconsideration of the rejections are respectfully requested in view of the above amendments and the following remarks, which follow the order set forth in the Office Action.

#### **Claim Rejections under 35 USC § 103**

1. Claims 1-12, 14-16, 18, 20, 23-38, 40-41, 43, 45, 48-52, 60-63 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (US Patent No. 6,500,605), hereinafter "Mullee" in view of DeSimone et al. (US Patent No. 5,866,005), hereinafter "DeSimone." Applicants traverse the rejection in view of the present amendment of claims 1 and 62, which includes subject matter of now cancelled claim 21, and of claim 25, which includes subject matter of now cancelled claim 46, and for the following reasons.

Claims 1, 25 and 62 were amended to recite that the surface passivator is selected from the group consisting of boric acid and triethyl borate. As a result, the references, alone or in combination, fail to recite each and every element of the instant claim.

Mullee discloses a method of removing photoresist and residue from a wafer by maintaining supercritical carbon dioxide, a solvent and aqueous fluoride in contact with the wafer. See col. 4, lines 34-38; 62-64. Mullee discloses that the solvent used is BLO (butyrolactone), DMSO (dimethyl sulfoxide) and glacial acetic acid, and water and that the aqueous fluoride is aqueous ammonium fluoride. See col. 11, lines 25-34. Mullee does not teach or reasonably suggest a surface passivator of boric acid or triethyl borate. The Action acknowledges, *inter alia*, that Mullee fails to specifically disclose a

binder which is derived from at least one ethylenically unsaturated reactant, for example polyvinyl alcohol or polyvinyl amine. OA, page 4.

DeSimone is asserted in the Action to remedy the deficit of Mullee with regard to the binder. DeSimone discloses separation of photoresist contaminant from a substrate (see col. 6, lines 43-52) with carbon dioxide fluid (see col. 2, lines 10-11; 36-52) and an amphiphilic species (see abstract; col. 2, lines 29-31). The amphiphilic species contains a CO<sub>2</sub>-philic segment and a CO<sub>2</sub>-phobic segment (see col. 3, lines 53-58). DeSimone does not disclose or reasonably suggest a surface passivator of boric acid or triethyl borate. The Action alleges that with respect to the binder, it would have been obvious to incorporate the amphiphilic species of DeSimone into the carbon dioxide fluid of Mullee because this would remove a wide range of organic and inorganic material contaminants as taught by DeSimone. OA, page 5.

However, Mullee, alone or in combination with DeSimone, does not disclose or reasonably suggest a surface passivator of boric acid or triethyl borate as presently claimed. As a result, the combination of Mullee or DeSimone fails to disclose each and every element of the instant claims. Therefore, a *prima facie* case of obviousness cannot be made. Reconsideration and withdrawal of the rejection of composition claims 1-12, 14-16, 18, 20, 23-24 and 62-63 is requested.

With respect to instant method claims 25-38, 40-41, 43, 45 and 48-52, Mullee or DeSimone, alone or in combination, lack any disclosure of boric acid or triethyl borate and therefore cannot contemplate a method of removing silicon-containing particulate matter from a semiconductor wafer surface with a SCF-based composition comprising a surface passivator of boric acid or triethyl borate as presently claimed. As a result, the combination of Mullee and DeSimone fails to disclose each and every element of the instant claims. Therefore, a *prima facie* case of obviousness cannot be made. Reconsideration and withdrawal of the rejection of method claims 25-38, 40-41, 43, 45 and 48-52 is requested.

2. Claims 13 and 39 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee and DeSimone as applied to the above claims, and further in view of Douglas et al. (US Patent No. 5,868,862), hereinafter "Douglas." Applicants traverse

the rejection in view of the present amendments to claim 1, from which claim 13 indirectly depends and to claim 25, from which claim 39 indirectly depends, and the following reasons.

Mullee and DeSimone were discussed above, specifically as to lacking a surface passivator of boric acid or triethyl borate as presently claimed. The Action acknowledges that Mullee and DeSimone fail to disclose incorporating into the composition a surfactant such as an anionic surfactant like sodium alkyl sulfates. OA, page 6. To remedy the deficit of Mullee and DeSimone as to the surfactant, the Action relies on Douglas. Douglas discloses a composition comprising supercritical carbon dioxide and surfactants for removing contaminants. See col. 5, lines 37-40. Douglas, however, does not disclose or suggest boric acid or triethyl borate or contemplate the use of either in a supercritical composition or in a method of removing silicon-containing particulates. As a result, Douglas in combination with Mullee and DeSimone, cannot disclose or reasonably suggest the incorporation of boric acid or triethyl borate in a supercritical based composition as presently claimed. Nor can Douglas in combination with Mullee and DeSimone, disclose or reasonably suggest a method of removing silicon-containing particulate matter from a semiconductor wafer surface with a SCF-based composition comprising a surface passivator of boric acid or triethyl borate as presently claimed. Therefore, because the combination of the cited art fails to disclose each and every element of the recited claim, a *prima facie* case of obviousness cannot be made. Reconsideration and withdrawal of the rejection of claims 13 and 39 is requested.

3. Claims 1-16, 18, 20-21, 23-41, 43, 45, 48, 51-54, 60-63 were rejected under 35 U.S.C. 103(a) as being unpatentable over Joyce et al. (US Patent No. 6,764,552), hereinafter "Joyce" in view of DeSimone. Applicants traverse the rejection in view of the present amendment of claims 1 and 62, which includes subject matter of now cancelled claim 21, and of claim 25, which includes subject matter of now cancelled claim 46, and for the following reasons.

Joyce discloses a supercritical cleaning solution of supercritical carbon dioxide with a fluoride source i.e., hydrogen fluoride or ammonium fluoride. See col. 13,

lines 11-29; col. 7, lines 17-52; col. 9, lines 18-20. Joyce discloses that the supercritical solution may comprise triethanolamine. See col. 8, lines 14-20. Joyce does not disclose or reasonably suggest a surface passivator of boric acid or triethyl borate. The Action acknowledges that Joyce fails to disclose a binder which is derived from at least one ethylenically unsaturated reactant, for example polyvinyl alcohol or polyvinyl amine. OA, page 8. To remedy the deficit with regard to the binder, the Action relies on DeSimone. The Action alleges that it would have been obvious to incorporate the amphiphilic species of DeSimone which contains a monomer segment like vinyl alcohol or amine segment into the supercritical cleaning solution of Joyce. *Id.*

However, neither Joyce nor DeSimone, alone or in combination, disclose or reasonably suggest a surface passivator of boric acid or triethyl borate as presently claimed. Nor do Joyce and DeSimone, alone or in combination, contemplate a method of removing silicon-containing particulate matter from a semiconductor wafer surface with a SCF-based composition comprising a surface passivator of boric acid or triethyl borate as presently claimed. As a result, the combination of Joyce or DeSimone fails to disclose each and every element of instant claims 1-16, 18, 20-21, 23-41, 43, 45, 48, 51-54, 60-63. Therefore, a *prima facie* case of obviousness cannot be made. Reconsideration and withdrawal of the rejection is requested.

4. Claims 1-16, 18, 20-41, 43, 45-54, 60-63 were rejected under 35 U.S.C. 103(a) as being unpatentable over Korzenski et al. (US Patent No. 6,943,139), hereinafter "Korzenski" in view of DeSimone. Applicants hereby declare and affirm that U.S. Patent No. 6,943,139, filed on October 31, 2002 and issued on September 13, 2005, in the name of Korzenski et al., was, at the time the invention of U.S. Application Serial No. 10/790,535 (the presently pending application) was made, wholly owned by Advanced Technology Materials, Inc. Thus, the Korzenski patent is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). Withdrawal of the rejection of claims 1-16, 18, 20-41, 43, 45-54, 60-63 is requested.

5. Claims 55, 58-59 were rejected under 35 U.S.C. 103(a) as being unpatentable over Clark et al. (US 2004/0171502), hereinafter "Clark." Applicants

traverse the rejection in view of the present amendment to claim 56 and for the following reasons. Applicants note that claim 55 is deemed allowable in the Action on page 12, and therefore its subject matter is not discussed or inferred *supra*.

Claim 56 was amended to include subject matter of cancelled claim 57. As claim 57 was deemed allowable, claim 56 as amended, is allowable. Claims 55, 58 and 59 now depend from an allowable claim and are therefore deemed allowable.

#### **Allowable Subject Matter**

The Action states claims 55 and 57 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. OA, page 12. The Action further states that none of the prior art of record teaches, discloses or suggests a method as required in claim 55, wherein the SCF-based composition comprises the recited ingredients, or a method as required in claim 57, wherein the pre-cleaning formulation comprises ammonium hydroxide, t- butyl hydrogen peroxide and water. *Id.* Applicants are appreciative of the Examiner's indication of allowable subject matter. Without acquiescing to any rejection to base claim 56, Applicants have amended claim 56 to include subject matter of now cancelled claim 57. As claim 55 depends from presently amended claim 56, which is now deemed allowable, claim 55 is also allowable. A Notice to this effect is respectfully requested.

#### **Supplemental Information Disclosure Statement**

In compliance with the ongoing duty of disclosure imposed by 37 C.F.R. §1.56, applicants submit herewith a Supplemental Information Disclosure Statement. The references U.S. Patent No. 6,989,358 in the name of Michael B. Korzenski et al., U.S. Patent No. 6,735,978 in the name of Glenn M. Tom et al., U.S. Patent Application Publication No. 20040224865 in the name of Jeffrey F. Roeder et al., and U.S. Patent Application No. 20040087174 in the name of Michael B. Korzenski, all 35 U.S.C. §102(c) references, were, at the time the invention of U.S. Application Serial No. 10/790,535 (the presently pending application) was made, wholly owned by Advanced

Technology Materials, Inc. Thus, these references are readily disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a).

**Petition for Extension of Time/Fees Payable**

Applicants hereby petition for a one (1) month extension of time, extending the deadline for responding to the October 18, 2007 Office Action from January 18, 2008 to February 19, 2008 (because February 18, 2008 is a Federal holiday). The fee of \$120.00 specified in 37 CFR §1.17(a)(1) for such one (1) month extension is hereby enclosed.

In addition, the fee under 37 CFR §1.17(p) of 180.00 for the Supplemental Information Disclosure Statement is enclosed.

The total fee of \$300.00 is being paid by Electronic Funds Transfer. Authorization is hereby given to charge any deficiency in applicable fees for this response to Deposit Account No. 13-4365 of Moore & Van Allen PLLC.


**Conclusion**

For the foregoing reasons, withdrawal of all rejections of claims 1-16, 18, 20-41, 43, and 45-63 is respectfully requested along with a Notice to this effect. If any questions remain, the Examiner is invited to contact the undersigned at the number given below.

Respectfully submitted,  
MOORE & VAN ALLEN PLLC

Date: February 19, 2008

By: \_\_\_\_\_

  
Christopher J. Knors  
Registration No. 45,569  
Moore & Van Allen PLLC  
430 Davis Drive, Suite 500  
Morrisville, NC 27560-6832  
Telephone: (919) 286-8000  
Facsimile: (919) 286-8199